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Mechanical Engineering  
19/ENGO61012  
CHM 102

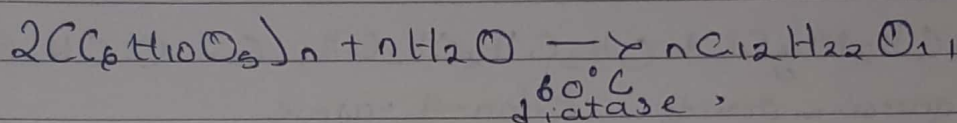
a) Classification of alcohol is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are 3 or 2, it is called primary alcohol ( $1^\circ$ ). If it is one hydrogen atom, it is called secondary atom ( $2^\circ$ ) and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called tertiary alcohol ( $3^\circ$ )

Example;  $\text{CH}_3\text{OH}$  - Methanol ( $1^\circ$ )  
 $\text{CH}_3\text{CH}_2\text{OH}$  - Ethanol ( $1^\circ$ )

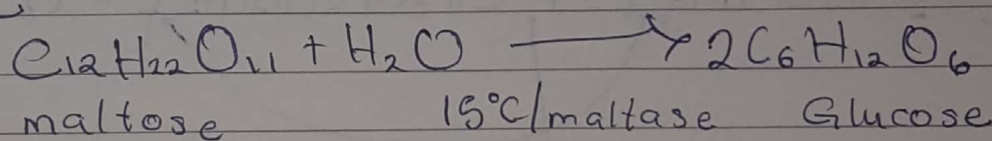
b) Classification of alcohol is also based on the number of hydroxyl group they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols which are also called glycols have two hydroxyl groups present in the alcohol structure while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl groups.

Example;  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  - Propanol (monohydric alcohol)  
 $\text{HOCH}_2\text{CH}_2\text{OH}$  - Ethane-1,2-diol (Dihydric alcohol)

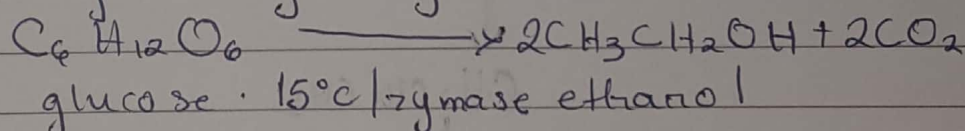
3 Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time, are converted into maltose by the enzyme diastase contained in the malt.



The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C

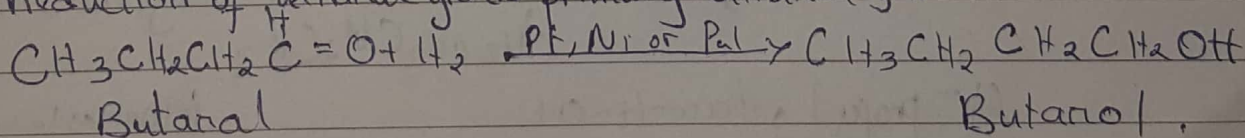


The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast

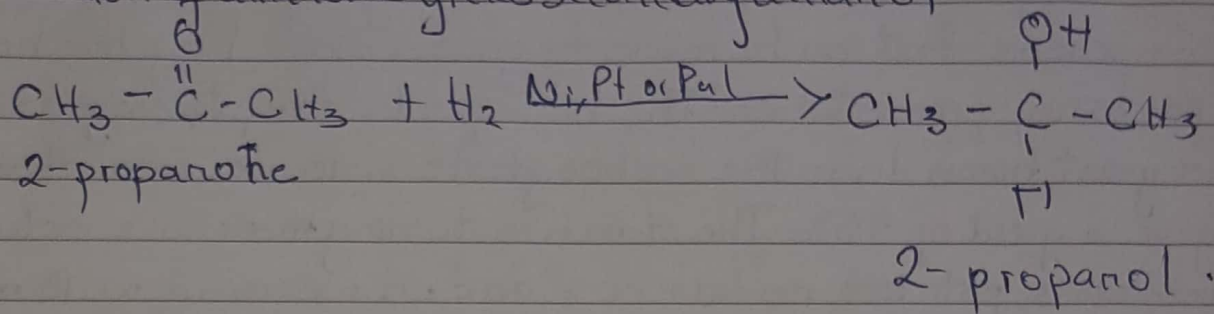


4 Alkanals and alkanones are reduced to primary and secondary alkanol by hydrogenation of carbon-oxygen double bond in the presence of a catalyst such as platinum (Pt), nickel (Ni), palladium (Pd) catalyst or with sodium tetraborate (IV) (NaBH<sub>4</sub>).

1) Reduction of alkanal yields primary alkanols.



1) Reduction of alkanone yields secondary alcohol



2 In the Grignard synthesis of alkanols, reacting

